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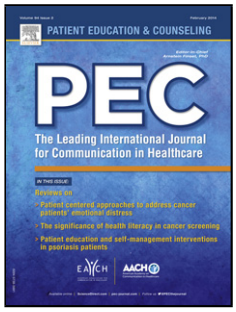

Title: Socioeconomic Inequality in the Provision of Health Advice in Dental Setting in England, Wales and Northern Ireland

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Socioeconomic Inequality in the Provision of Health Advice in Dental Setting in England, Wales and Northern Ireland

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Running title: Inequalities in health advice in dental setting

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Key Words: Health advice, oral health, health-promoting behaviours, health inequalities, dental practice

Highlights

- Socioeconomic inequalities providing health advice in dental setting exist.
- Less educated and less affluent individuals are less likely to get health advice.
- The findings imply that health advice is not given to those who need it most.

Abstract

Objective: To assess socioeconomic inequalities in health advice provided in dental setting.

Methods: Data were from the Adult Dental Health Survey, 2009 of England, Wales and Northern Ireland. Index of Multiple Deprivation, occupational classification and education were used to assess differences in advice on diet, oral hygiene and dental visits using logistic regression.

Results: The analysis included 6,279 participants with complete data. There were significant socioeconomic inequalities in all health advice provided in dental setting. Those with a higher level of education had significant odds ratios of 1.36 (1.06-1.75), 1.40 (1.15-1.70), and 1.82 (1.47-2.25) for having advice on diet, dental visits and oral hygiene, respectively compared to those with lower education.

Conclusion: Inequalities in health advice in the dental setting resemble inequalities in oral health. This implies that those who are most likely to need behaviour-related advice do not receive it. Health policies should address the underpinning causes of inequalities in health advice.

Practice Implications: Growing evidence supports the importance of health advice given in dental practice. More time and greater resources should be allocated for comprehensive

health advice particularly to the socially disadvantaged to reduce inequalities and subsequently promoting health-related behaviours.

1. Introduction

There is increasing recognition of the importance of general health advice given in dental practice [1, 2]. Dental professionals are in a position to take an active role in supporting their patients to adopt health-promoting behaviours particularly about smoking, alcohol, and diet, among other risk factors [3-6]. Accordingly, smoking cessation interventions, such as brief advice, are recommended [7], and dental professionals are crucial in helping individuals stop smoking. Dentist implementing smoking cessation programs may achieve quit rates up to 10-15% each year [2, 8]. Likewise, growing evidence suggests that brief alcohol interventions in dental practice may be potentially effective in reducing alcohol consumption among serious drinkers [9]. Evidence also shows that dietary advice in primary care settings would be valuable in achieving modest dietary changes and reducing cardiovascular risk factors [10]. Moreover, dietary advice in dental setting can positively influence healthy eating behaviours to prevent obesity and dental caries [11]. Furthermore, the known relationship between oral and general health necessitates dentist-patients communication related to general health problems and behaviours, such as diabetes and HPV vaccination for their known relationship with periodontal diseases and oral cancer [12-14].

However, higher demands for extensive clinical work, time constraints, and lack of financial incentives are common barriers to adequate health advice in dental setting [15]. Moreover, evidence shows that health advice is more likely to be delivered in private practice rather than in the public setting[16], which involves possible inequalities in health advice favouring the most affluent groups.

The doctor-patient communication relationship is complex and mutually influenced. Thus, doctors' communicative behaviour is related to the patient's social characteristics and patients communicate differently depending on their socioeconomic position [17]. Substantial

evidence shows socioeconomic and ethnic inequality in health advice and patients-providers communications in general medical practice [10, 17-23]. Accordingly, patients of higher social position are more likely to receive more information from their doctor [23]. This inverse relationship between socioeconomic position and health advice has been repeatedly demonstrated in different countries, settings and using different indicators of socioeconomic position [24, 25]. In dental practice, racial inequalities in dentists-patients communication were found in the USA, with African Americans less likely to communicate about their oral health or behaviours with White dental providers [26]. In the UK it was argued that providing financial incentives might improve health advice in dental setting in deprived areas [15]. However, to the authors' knowledge, no study has explicitly examined socioeconomic inequality in health advice in dental setting.

In view of limited literature on socioeconomic inequalities in the provision of health advice in dental settings, this study investigated the relationship between socioeconomic factors and health advice given by dental providers in a nationally representative sample of England, Wales, and Northern Ireland. Thus, this study aimed to assess socioeconomic and ethnic variations in the provision of advice on diet, oral hygiene, and dental visits in dental setting.

2. Methods

2.1. Study design

Data were from the Adult Dental Health Survey (ADHS) 2009, a cross-sectional nationally representative oral health survey of England, Wales, and Northern Ireland. The survey used a two-stage cluster of 253 primary sampling units (2 postcode sectors with 25 addresses sampled) across England and Wales, and 15 in Northern Ireland, giving a total sample of 13,400 addresses [27].

The ADHS 2009 consisted of a questionnaire-based interview and a dental examination in the homes of all consented adults at a sampled address; only adults with at least one natural tooth were invited to participate in the dental examination. Overall, 11,380 participants were interviewed, and 6,479 of them were also clinically examined. This study included 6,279 participants who had complete data on all variables used in the analysis. Further information regarding the survey has been described elsewhere [28].

The ADHS included questions on sociodemographic factors, health-related behaviours, use of dental services and provision of health advice in the dental office. Training feedback sessions were provided to standardise the interviewers [28, 29].

Outcome variables were based on self-reported questions on whether participants during their last completed course of dental treatment, have been advised by the dentist or member of the dental team on (1) diet, (2) frequency of dental visits, and (3) oral hygiene (cleaning teeth/ gum).

Socioeconomic indicators included level of education, occupational classification, and Index of Multiple Deprivation (IMD). Education was computed from two questions, indicating if the participants had any professional, vocational or work-related educational qualification and whether they had a qualification above or below a degree. Education variable used in the analysis included three groups; having a professional degree, professional or work-related qualification without a degree and no professional qualification. Occupational classification was based on the National Statistics Socio-economic classification (NS-SEC) 3 class version [30] and included four groups: managerial/professional, intermediate, routine or manual occupation, and had never worked. IMD is the level of relative deprivation of an area and range from 1 (most deprived) to 10 (least deprived).

Other variables used in the analysis were age (16-24, 25-44, 45-54, 55-64, 65-74, 75+), sex, country (England, Wales and Northern Ireland), frequency of dental visits (once/ 6 months, once/ year and less than once/ year). Ethnicity included four groups: White, Black, Asian, and other ethnicities.

2.2. Statistical Analysis

Survey analysis accounting for sampling weight was used throughout the analysis. The analysis was limited to those with complete data (6,279). Descriptive statistics were conducted for all variables used in the analysis. The provision of health advice was examined within socioeconomic and ethnic groups. Logistic regression models were constructed for each of dietary advice, oral hygiene advice and dental visit advice. All regression models were adjusted for age, sex, country, IMD, education, occupational classification, ethnicity and frequency of dental visits.

3. Results

Tables 1 shows the demographic and socioeconomic characteristics of the 6,279 participants included in the analysis. No major differences in the demographic and socioeconomic factors were found between the study sample and those excluded because of missing values. Most of the respondents were Whites (89.2%), from England (91.8%) in the 25-44 age group (36.7%). Approximately, 51% of the respondents were females (Table 1). Oral hygiene advice was higher among White respondents (80.2%), dietary advice was higher among Blacks (24.3%), and advice on frequency of dental visits was higher among Asians (71.8%). Participants with managerial or professional occupations had a higher level of advice on dental visits (78.3%), diet (27.1%) and oral hygiene (84.8%) (Table 2)

The results of the regression models generally showed that individuals with higher socioeconomic position were more likely to have advice on diet, oral hygiene and dental visits than those with lower socioeconomic position (Table 3). Participants with university degree were more likely to receive advice on diet, oral hygiene, and dental visits with Odds Ratios (OR) 1.36 (95%CI: 1.06, 1.75), 1.82 (95%CI: 1.47, 2.25) and 1.40 (95%CI: 1.15, 1.70), respectively compared to those with no educational qualification. Those with routine/manual occupations had lower odds for dental visits advice (OR: 0.63, 95%CI: 0.53, 0.74)) and oral hygiene (OR: 0.74, 95%CI: 0.61, 0.90) compared to those with professional/ managerial occupations (Table 3). IMD was also associated with health advice with those living in less deprived areas more likely to have advice on oral hygiene and dental visits. Differences in health advice among ethnic groups in the regression models were not statistically significant. Those reporting visiting a dentist less than once a year were also less likely to receive advice (Table 3).

4. Discussion and Conclusion

4.1. Discussion

We examined socioeconomic and ethnic variations in health advice provided by dental practitioners in a nationally representative sample of adults in England, Wales, and Northern Ireland. The findings demonstrated socioeconomic inequalities in the provision of health advice on diet, oral hygiene and dental visits with the least educated, those with manual occupations, and those living in most deprived areas less likely to receive health advice in dental setting.

In this study, participants belonging to the unemployed and manual workers groups were least likely to receive dietary, dental visit and oral hygiene advice. The analysis also showed that education gradients exist in dietary advice, dental visit advice, and oral hygiene. No previous studies have investigated the relationship between socioeconomic position and the provision of advice on diet, dental visits and oral hygiene in dental setting. However, a social gradient in access to dental care and dentist-patient communication has been reported in several studies in North America where minority groups such as Chinese and Hispanic groups experienced less access to dental care and health information [31, 32]. Nonetheless, these ethnic inequalities have been attributed to language barriers [33]. Generally, health advice, mainly those not viewed as directly related to dental care, are infrequently provided by dental practitioners [34]. This has been primarily ascribed to the insufficient remuneration for clinical time spent on these types of service but also lack of remuneration, misunderstanding, cost, and a lack of time [3]. English dentists identified insufficient payment as a barrier to the use of diet diaries in dental practice [35]. Others have argued that dentists do not believe patients with lower social classes and those from more deprived areas would benefit from health advice [36]. On the other hand, it is also possible those at the lower

end of the social hierarchy tend to visit dentists only when they have urgent conditions with little time and lower priority for adequate communications with the dentists.

This study found no significant difference in terms of health advice given between ethnic groups. The findings pertaining to ethnic differences should be interpreted with caution due to the relatively small numbers of ethnic minorities included in the survey.

Perhaps the significance of the findings of this research is that health advice was more likely to be provided to the more educated and more affluent individuals who usually have better oral health and behaviours, thus highlighting an inverse care law in health advice in dental setting .

It is worth highlighting that in the UK, dental services are covered under the publicly funded national healthcare system for the UK or NHS (National Health Service), which provides relatively equal access to service compared to other countries where dental visits depend on the availability of insurance. An earlier study in the UK demonstrated socioeconomic inequalities in the use of certain procedures that requires longer and repeated visits [38]. These inequalities were attributed to indirect costs of dental visits such as difficulty in taking time off work, longer waiting time, and cost of transportation among other factors. Therefore, those at the bottom of the social hierarchy may visit a dentist only to receive urgent care when there is less time for conversation with the dentist. The possible role of indirect costs of dental visits highlights the importance of the social determinants of health and related behaviours even when universal dental coverage exists. Thus, similar provider-related factors may influence dentist-patient communication. One can only speculate that in other countries, where the cost of dental visit/ insurance is an added barrier, inequality in dentist-patient communication would be even higher.

To the best of our knowledge, this is the first study examining socioeconomic inequalities in the provision of various aspects of health advice in the dental setting, using a representative sample of England, Wales, and Northern Ireland. While systematic reviews may have questioned the effect of health education and advice on improving oral health of the population, it was interesting to find that those who are most in need of the advice are the least likely to receive it.

The study has limitations. First, the cross-sectional design does not support temporality. Thus, it is not possible to determine if the advice was provided on every visit or only received once. Second, the occupational classification used here does not necessarily reflect material wealth. However, other indicators of socioeconomic factors such as IMD and education confirmed the inequality observed in occupational classification. Reporting bias inherent to self-reported data and recall bias particularly if the last visit was a long time ago, are also limitations that could have led to over or underestimation of key variables. Finally, the low representativeness of ethnic minorities in the survey could have led to under-estimation of the ethnic variations in health advice.

4.2. Conclusion

A clear social class, IMD and education inequalities were observed in the provision of health advice about diet, oral hygiene, and frequency of dental visits in a dental setting. The findings imply an inverse care law in health advice in dental setting in England, Wales, and Northern Ireland. Health policies should address the underpinning causes of inequalities in health advice.

4.3. Practice Implications

Although the benefits of health advice given in dental practice have been extensively studied, inequalities persist. Providing guidance and information to all patients on an equal basis is

essential in supporting health-related behaviour change. Thus, the role of the dental team in delivering consistent advice on diet, oral hygiene and dental visits is crucial if health inequalities are to be reduced. More resources and time need to be allocated to health advice and patients communication, particularly to those at the lower end of the social hierarchy and those with greater health needs. Therefore, supporting health advice in dental setting may contribute to tackling health disparities and subsequently in health-related behaviours.

Conflict of interest

All authors declare no conflict of interest. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Author statement

Osama Ahmadi: Conceptualization, Methodology, Formal Analysis, Writing- Original draft preparation. **Wael Sabbah:** Conceptualization, Supervision, Writing- Reviewing and Editing. **Carolina Machuca:** Writing- Reviewing and Editing the final draft.

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References

[1] K. Warnakulasuriya, C. Harris, D. Scarrott, R. Watt, S. Gelbier, T. Peters, N. Johnson, Oral cancer: an alarming lack of public awareness towards oral cancer, British Dental Journal 187(6) (1999) 319-322.

[2] R. Watt, B. Daly, S.E.E. Kay, Prevention. Part 1: smoking cessation advice within the general dental practice, British Dental Journal 194(12) (2003) 665.

[3] T. Dyer, P. Robinson, General health promotion in general dental practice—The involvement of the dental team Part 2: A qualitative and quantitative investigation of the views of practice principals in South Yorkshire, British Dental Journal 201(1) (2006) 45-51.

[4] R. Harris, A. Gamboa, Y. Dailey, A. Ashcroft, One- to- one dietary interventions undertaken in a dental setting to change dietary behaviour, The Cochrane Library (2012).

[5] Public Health England, Delivering better oral health: an evidence-based toolkit for prevention, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/605266/Delivering_better_oral_health.pdf, 2017 (accessed 07 May 2019).

[6] M. Tavares, A. Dewundara, J.M. Goodson, Obesity prevention and intervention in dental practice, Dental Clinics of North America 56(4) (2012) 831-846.

[7] M. Raw, A. McNEILL, R. West, Smoking Cessation Guidelines for Health Professionals—A guide to effective smoking cessation interventions for the health care system, Thorax 53(suppl 5) (1998) S1-S18.

[8] S. Warnakulasuriya, Effectiveness of tobacco counseling in the dental office, Journal of Dental Education 66(9) (2002) 1079-1087.

[9] A. McAuley, C. Goodall, G. Ogden, S. Shepherd, K. Cruikshank, Delivering alcohol screening and alcohol brief interventions within general dental practice: rationale and overview of the evidence, British Dental Journal 210(9) (2011) E15.

[10] E. Brunner, I. White, M. Thorogood, A. Bristow, D. Curle, M. Marmot, Can dietary interventions change diet and cardiovascular risk factors? A meta-analysis of randomized controlled trials, American Journal of Public Health 87(9) (1997) 1415-1422.

[11] V.R. Chomitz, H.J. Park, S. Koch- Weser, K.K.H. Chui, L. Sun, M.E. Malone, C. Palmer, C.Y. Loo, A. Must, Modifying dietary risk behaviors to prevent obesity and dental caries in very young children: results of the Baby Steps to Health pediatric dental pilot, Journal of Public Health Dentistry (2019).

[12] W.J. Teeuw, V.E. Gerdes, B.G. Loos, Effect of periodontal treatment on glycemic control of diabetic patients: a systematic review and meta-analysis, Diabetes Care 33(2) (2010) 421-427.

[13] W.S. Borgnakke, P.V. Ylöstalo, G.W. Taylor, R.J. Genco, Effect of periodontal disease on diabetes: systematic review of epidemiologic observational evidence, Journal of Clinical Periodontology 40 (2013) S135-S152.

[14] C. Hobbs, J. Sterne, M. Bailey, R. Heyderman, M. Birchall, S. Thomas, Human papillomavirus and head and neck cancer: a systematic review and meta- analysis, Clinical Otolaryngology 31(4) (2006) 259-266.

[15] P. Brocklehurst, J. Price, A.M. Glenny, M. Tickle, S. Birch, E. Mertz, J. Grytten, The effect of different methods of remuneration on the behaviour of primary care dentists, Cochrane Database Syst Rev (11) (2013) CD009853.

[16] M. Nasser, Evidence summary: is smoking cessation an effective and cost-effective service to be introduced in NHS dentistry?, British Dental Journal 210(4) (2011) 169-177.

[17] E. Verlinde, N. De Laender, S. De Maesschalck, M. Deveugele, S. Willems, The social gradient in doctor-patient communication, International Journal for Equity in Health 11(1) (2012) 12.

[18] R. Hiscock, K. Judge, L. Bauld, Social inequalities in quitting smoking: what factors mediate the relationship between socioeconomic position and smoking cessation?, Journal of Public Health (2010) fdq097.

[19] V.H. Rice, L.F. Stead, Nursing interventions for smoking cessation, The Cochrane Library (2008).

[20] J. Rosseel, J. Jacobs, S. Hilberink, I. Maassen, R. Allard, A. Plasschaert, R. Grol, What determines the provision of smoking cessation advice and counselling by dental care teams?, British Dental Journal 206(7) (2009) E13-E13.

[21] C. Silagy, L. Stead, Physician advice for smoking cessation, The Cochrane Library (2001).

[22] A.S. Szklo, J.F. Thrasher, C. Perez, V.C. Figueiredo, G. Fong, L.M.d. Almeida, Understanding the relationship between socioeconomic status, smoking cessation services provided by the health system and smoking cessation behavior in Brazil, Cadernos de Saúde Pública 29(3) (2013) 485-495.

[23] S. Willems, S. De Maesschalck, M. Deveugele, A. Derese, J. De Maeseneer, Socio-economic status of the patient and doctor–patient communication: does it make a difference?, Patient Education and Counseling 56(2) (2005) 139-146.

[24] R. Edwards, P. McElduff, D. Jenner, R.F. Heller, J. Langley, Smoking, smoking cessation, and use of smoking cessation aids and support services in South Derbyshire, England, Public health 121(5) (2007) 321-332.

[25] L. Douglas, L. Szatkowski, Socioeconomic variations in access to smoking cessation interventions in UK primary care: insights using the Mosaic classification in a large dataset of primary care records, BMC Public Health 13(1) (2013) 546.

[26] K.A. Williams, C.A. Demko, J.A. Lalumandier, S. Wotman, Caring for African-American patients in private practice: disparities and similarities in dental procedures and communication, The Journal of the American Dental Association 139(9) (2008) 1218-1226.

[27] I. O'Sullivan, D. Lader, C. Beavan-Seymour, V. Chenery, E. Fuller, K. Sadler, Foundation report: adult dental health survey 2009 (technical information), Adult Dental Health Survey 2009 (2011) 138.

[28] D. White, G. Tsakos, N. Pitts, E. Fuller, G. Douglas, J. Murray, J. Steele, Adult Dental Health Survey 2009: common oral health conditions and their impact on the population, British Dental Journal 213(11) (2012) 567-572.

[29] J. Steele, NHS dental services in England, London: Department of Health (2009) 1-86.

[30] T. Chandola, C. Jenkinson, The new UK National Statistics Socio-Economic Classification (NS-SEC); investigating social class differences in self-reported health status, Journal of Public Health 22(2) (2000) 182-190.

[31] T.A. Dolan, K. Atchison, T.N. Huynh, Access to dental care among older adults in the United States, Journal of Dental Education 69(9) (2005) 961-974.

[32] D. Shelley, S. Russell, N.S. Parikh, M. Fahs, Ethnic disparities in self-reported oral health status and access to care among older adults in NYC, Journal of Urban Health 88(4) (2011) 651-662.

[33] R.I. Garcia, C.A. Cadoret, M. Henshaw, Multicultural issues in oral health, Dental Clinics of North America 52(2) (2008) 319-332.

[34] J. Franki, M. Hayes, J. Taylor, The provision of dietary advice by dental practitioners: A review of the literature, Community Dent Health 31(1) (2014) 9-14.

[35] A. Arheiam, S. Brown, G. Bruinside, S. Albadri, S. Higham, R. Harris, The use of diet diaries in general dental practice in England, Community Dent Health 33 (2016) 1-7.

[36] N. Williams, J. Whittle, A.C. Gatrell, The relationship between socio-demographic characteristics and dental health knowledge and attitudes of parents with young children, British Dental Journal 193(11) (2002) 651.

[37] J.T. Hart, The inverse care law, The Lancet 297(7696) (1971) 405-412.

[38] J. Cheema, W. Sabbah, Inequalities in preventive and restorative dental services in England, Wales and Northern Ireland, British Dental Journal 221(5) (2016) 235.

Table 1: Demographic and socioeconomic characteristics of participants of the ADHS 2009, England, Wales and Northern Ireland 2009 (N=6279)

		Percentage/ mean (95%CI)
Age	16-24	15.3% (14.2-16.5)
	25-44	36.3% (34.9-37.7)
	45-54	16.9% (15.9-17.9)
	55-64	15.2% (14.3-16.1)
	65-74	9.6% (8.9-10.4)
	75 and over	6.7% (6.1-7.4)
Sex	Males	48.7% (47.3-50.1)
	Females	51.3% (49.9-52.7)
Ethnic groups	All whites	89.2% (88.1- 90.2)
	All Asians	2.2% (1.7-2.7)
	All Blacks	5.9% (5.2-6.8)
	Other	2.7% (2.2-3.3)
Country	England	91.8% (91.2-92.4)
	Wales	5.2% (4.7-5.7)
	Northern Ireland	3.0% (2.7-3.3)
Occupational classification (NS-SEC 3)	Managerial/ professional	35.0% (33.6-36.3)
	Intermediate occupations	20.0% (19.0-21.2)
	Routine/manual occupations	36.1% (34.7-37.5)
	Never worked	8.9% (8.0-9.8)
Education	No qualification	21.1% (20.0-22.2)
	Qualification below degree	52.9% (51.5-54.3)
	Degree	26.0% (24.7-27.3)
Index of Multiple Deprivation (mean)		5.80 (5.72-5.88)
Frequency of dental visits	At least every 6 months	50.8% (49.4-52.3)
	At least once every year	21.3% (20.2-22.5)
	Less than once every year	27.8% (26.5-29.2.6)
Dietary advice	Yes	26.5% (25.2-27.8)
	No	73.5% (72.2-74.8)
Oral hygiene advice	Yes	79.6% (78.4-80.7)
	No	20.4% (19.3-21.6)
Advice on dental visits	Yes	71.3%(70.0-72.6)
	No	28.7% (27.4-30.0)

Table 2: Distribution of use of health advice within socioeconomic and ethnic groups, England, Wales and Northern Ireland 2009 (N=6279)

		Dietary advice (95%CI)	Oral hygiene advice (95%CI)	Dental visit advice (95%CI)
Ethnicity	All whites	26.5% (25.2-27.9)	80.2% (79.0-81.3)	71.7% (70.4-73.0)
	All Asians	21.4%(13.0-33.1)	71.8% (60.4-80.9)	71.8% (60.8-80.7)
	All blacks	28.0% (22.4-34.4)	76.1%(70.1-81.2)	69.4%(63.0-75.1)
	Others	27.0% (19.2-36.6)	73.6% (63.7-81.7)	62.1% (51.9-71.3)
Education	No qualification	15.4% (13.3-17.7)	67.5% (64.6-70.2)	60.5% (57.6-63.3)
	Qualification below degree	29.0% (27.2-30.9)	81.0% (79.4-82.4)	71.5% (69.7-73.2)
	Degree	30.4% (27.8-33.1)	86.6% (84.5-88.5)	79.8% (77.4-82.0)
Occupational classification (NS-SEC 3)	Managerial/ professional	27.1% (25.0-29.3)	84.8% (83.0-86.4)	78.3% (76.4-80.2)
	Intermediate occupations	24.1% (21.5-26.9)	80.4% (77.9-82.7)	73.7% (70.9-76.3)
	Routine/manual occupations	25.7% (23.7-27.9)	75.6% (73.5-77.6)	65.1% (62.8-67.4)
	Never worked	32.4% (27.6-37.7)	73.4% (68.5-77.8)	63.6% (58.4-68.5)

Table 3: Regression analysis showing odds ratios for factors associated with health advice in England, Wales and Northern Ireland 2009 (N=6279)

		Dietary advice	Dental visit advice	Oral hygiene advice
Age (reference: 16-24 years)	25-44	0.63*** (0.50-0.79)	1.35** (1.08-1.70)	1.30 (0.99-1.69)
	45-54	0.41*** (0.32-0.53)	1.06 (0.82-1.38)	1.21 (0.90-1.63)
	55-64	0.23*** (0.17-0.30)	1.06 (0.82-1.35)	1.03 (0.77-1.39)
	65-74	0.17*** (0.12-0.24)	0.87 (0.67-1.14)	0.74 (0.55-1.00)
	74 and older	0.16***(0.10-0.24)	0.66** (0.49-0.89)	0.46*** (0.33-0.63)
Sex (reference: males)		1.04 (0.91-1.20)	0.98 (0.86-1.11)	0.99 (0.85-1.14)
Ethnic groups (reference: Whites)	Blacks	0.88 (0.64-1.22)	0.96 (0.70-1.32)	0.85 (0.61-1.20)
	Asians	0.65 (0.36-1.18)	1.11 (0.67-1.85)	0.67 (0.39-1.16)
	Others	0.76 (0.48-1.19)	0.68 (0.45-1.04)	0.72 (0.45-1.15)
Country (reference: England)	Wales	0.93 (0.71-1.23)	0.78* (0.62-0.99)	0.87 (0.66-1.15)
	Northern Ireland	1.33* (1.03-1.71)	1.22 (0.95-1.57)	0.75* (0.57-0.99)
Occupational Classification (reference: Managerial/ professional)	Intermediate	0.92 (0.76-1.12)	0.86 (0.71-1.04)	0.85 (0.69-1.05)
	Routine/Manual	0.91 (0.77-1.09)	0.63*** (0.53-0.74)	0.74** (0.61-0.90)
	Never worked	0.94 (0.70-1.28)	0.66** (0.50-0.87)	0.75 (0.54-1.04)
Education (reference: no qualification)	Qualification, no degree	1.24 (0.96-1.61)	1.12 (0.91-1.36)	1.42** (1.15-1.77)
	Degree	1.36* (1.06-1.75)	1.40** (1.15-1.70)	1.82*** (1.47-2.25)
Index of Multiple Deprivation (higher score is less deprived)		0.99 (0.96-1.01)	1.03* (1.01-1.05)	1.03** (1.01-1.07)
Dental visit (reference: Once/ 6 months)	Once/ year	0.99 (0.83-1.18)	0.94 (0.79-1.11)	0.75** (0.62-0.91)
	Less than once/ year	0.91 (0.76-1.07)	0.68*** (0.58-0.79)	0.53*** (0.44-0.63)

*** p<0.001, ** p<0.01, * p<0.05